

STUDIES IN THE THEACEAE, XXX
THE AFRICAN SPECIES OF TERNSTROEMIA

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THE GENUS *Ternstroemia* is the largest genus of the family Theaceae with a nearly equal distribution of taxa in the tropical and subtropical regions of both the Eastern and Western Hemispheres.

In 1942 and 1943, three papers * dealing with the genus in the Western Hemisphere were published. The author was very much handicapped in that work since the study was made during the early war years and the European types of the genus were not available to him. The present study is a part of one encompassing the remaining members of the group, those of the Eastern Hemisphere. As in the treatment of the western species the results will be published in a series of papers based on regional distribution. There are several reasons for this manner of presentation. First, the taxa are generally quite endemic within a small area of distribution. The characters available for clear-cut distinction between taxa are very few and variable. Hence, a regional treatment is very helpful to any future worker, since he need consider only the taxa from a proscribed area. By the same token it is helpful to the author especially in making a key. To make a workable key to the complete genus may be possible — but hardly probable. An intense study of the group shows that there are many intangibles which the author learns to recognize but cannot use in presenting a key. This is especially true in the Indonesian species, which have been studied and will be treated later.

The genus *Ternstroemia* was first proposed by Linnaeus f. in 1781. Various other names have been applied to this genus, such as *Taonabo* Aublet (1775), *Dupinia* Scoparius (1777), *Hoferia* Scoparius (1777), *Tonabea* Jussieu (1789), *Amphania* Banks (1821), *Reinwardtia* Korthals (1840), *Llanosia* Blanco (1845), *Erythrochiton* Schlechter (1846), *Voelckeria* (1847) and *Mokofua* Kuntze (1891). *Taonabo* is the *nomen prius* of this group of synonyms and until a few years ago was used by several of the American botanists who followed the rule of strict priority laid down by the "American Code" of nomenclature. However, the name *Ternstroemia* has been included in the International Code of Botanical Nomenclature as one of the *nomina conservanda* and the name *Taonabo* listed as a *nomen rejiciendum*, thus ending any controversy which might have existed over the correct name.

The description below applies to the entire genus, the portions inapplicable to the African species being inclosed in brackets.

* Jour. Arnold Arb. 23: 298-343, 464-478. 1942; 24: 60-70. 1943.

Ternstroemia Mutis ex Linnaeus f. Suppl. Pl. 39. 1781.

Flowers hermaphroditic, dioecious [or androdioecious]. Sepals 5, imbricate, persistent. Petals 5, connate at the base [free or joined to the middle or above], stamens 15-∞, 2-several-seriate, rarely 1-seriate; filaments connate, the outer filaments adnate to the base of the corolla; anthers oblong or linear, as long as or longer than the filaments, dehiscing longitudinally, the connective usually projected into an apiculate or caudate appendage, rarely muticous. Ovary 2[3, rarely 1]-loculate, the ovules in each locule 2[-20], rarely solitary, pendulous from the apex of the placenta on more or less evolute funiculi. Style 1, entire [or rarely 2- or 3-parted], stigma or stigmata punctiform or evolute, entire or lobate. Fruit irregularly dehiscent, often explosively so. Seeds usually 4 [rarely 2-16]; testa opaque, smooth, rarely plicate-rugulose, yellow, usually covered with reddish, many-celled papilli; endosperm pulpy, ± developed, seldom lacking; embryo bent nearly double, oily, with half-terete or flat cotyledons.

Glabrous trees or shrubs with branches usually verticillate or subopposite. Leaves spirally disposed, congested or verticillate at the apex of the current year's growth, usually coriaceous, rarely chartaceous, entire or subentire. Flowers axillary, solitary, bracteolate, the bracteoles 2 [rarely 4], opposite or subopposite, placed immediately below the calyx, rarely with one somewhat removed and alternate on the pedicel.

TYPE SPECIES: *Ternstroemia meridionalis* Mutis ex Linn. f.

KEY TO SECTIONS AND SPECIES

Flowers hermaphroditic. Leaves thick-coriaceous. Stamens 15-20, arranged in a single series. Ovary semiglobose, 2-loculate, each locule 2-ovulate. Stigma 2-punctate. Angola. § TERNSTROEMIA. *T. africana*.

Flowers dioecious. Leaves chartaceous-coriaceous. Staminate flowers: Stamens many, ca. 60, arranged in several series. Pistillodium negligible or lacking. Pistillate flowers: Stamens much reduced in character, arranged in two series. Ovary 2-loculate, each locule 2-ovulate. Stigma bilobed, each lobe rounded and convex, ca. 2 mm. across. Tanganyika. . . . § ERYTHROCHITON. *T. polypetala*.

Ternstroemia africana Melchior, Notizbl. Bot. Gart. Berlin 8: 659. 1924; Nat. Pflanzenfam. ed. 2. 21: 142. 1925. — Exell, Jour. Bot. 74: Suppl. 21. 1936. — Exell & Mendonça, Consp. Fl. Angol. 1: 131. 1937.

Adinandrella congolensis Exell, Jour. Bot. 65: Suppl. 30, fig. 1927, "congolense."

Tree, glabrous throughout; branchlets generally terete, longitudinally striate in drying, reddish or reddish gray, the younger branchlets angled-striate in drying. Leaves coriaceous, obovate or obovate-elliptic, (4-)8-10 cm. long, (2-)4-5 cm. wide, obtuse or rounded at the apex, rarely somewhat emarginate, cuneate at the base, the margin lightly recurved, entire, occasionally slightly subserrate near the apex, the midrib canaliculate

above, elevated below, the veins ca. 7 pairs, inconspicuous on both surfaces; petiole 5–8 mm. long, canaliculate above, lightly and distinctly glandular-denticulate along the margin. Flowers hermaphroditic, solitary, axillary; pedicel 3–4.5 cm. long, somewhat thickened at the apex; bracteoles 2, subopposite, immediately below the calyx, oblong, ca. 4 mm. long, 1.6–1.8 mm. wide, obtuse; calyx-lobes 5, coriaceous, 7–7.5 mm. long, ca. 6 mm. wide, suborbicular, rounded at the apex (sometimes emarginate and mucronulate), unguiculate at the base, chartaceous at the margin; corolla-lobes 5, membranaceous, lanceolate-ovate, 8–8.5 mm. long, 3–3.5 mm. wide, lightly connate at the base; stamens 15–20, arranged in a single series, the filaments 1–2 mm. long, adnate to the base of the corolla, the anthers 3.5–4.5 mm. long, narrowly lanceolate, projected at the apex into a subulate connective 0.5–1 mm. long. Ovary semiglobose to ovoid, 4–5 mm. long, 2–4 mm. diameter, 2-loculate, each locule 2-ovulate; style ca. 4 mm. long; stigma punctate. Fruit not known.

Angola: Zaire, at sea level, near the river Congo, Sumba, Lower Congo, *J. Gossweiler* 8592 (BM, type of *Adinandrella congolensis* and lectotype of *T. africana*), Dec. 2, 1921.

Ternstroemia africana was described by Melchior in 1924. Three years later, Exell, working with a duplicate of the type and not knowing of Melchior's earlier disposition of the Berlin specimen, proposed *Adinandrella* as a new genus. Later, in 1936, Exell agreed with Melchior's treatment of the specimens and designated his *Adinandrella* as a synonym of *T. africana*. I had an opportunity to study the type of *Adinandrella congolensis* while at the British Museum in the summer of 1960 and am very thankful for Exell's "first mistake," as he termed it, because up until then I had not known of either the existence of Exell's species or its relationship to Melchior's *T. africana*. The original specimen with which Melchior worked at Berlin has been destroyed, hence the specimen in the British Museum should become the type for *T. africana*, as well as *Adinandrella congolensis*.

An attempt to obtain additional material this past year from the herbarium at Luanda, Angola, has been unsuccessful, leading one to believe that the species has been collected only once. As a result, no dissections of the flowers of this species have been available to me. However, since the two descriptions of Melchior and Exell are so alike, and, as I believe, accurate, I do not feel the lack too greatly.

Exell refers to the stamens as arranged in triads but does not appear certain of this arrangement. Melchior makes no comment on this arrangement. They both may be right. Since the stamens are arranged in a single series and are adnate to the base of the corolla and since there are approximately fifteen stamens it just may be that there are three stamens to each corolla-lobe. However, Melchior, who has studied the group more extensively than Exell and is more accustomed to the multiple series of stamens usually found in the genus, would give little attention to such an arrangement, accepting it as a single series, as would I.

The main differences between the two African species are actually those between the two sections as found in the Asiatic species and the American species. This species from Angola, on the west coast of Africa, resembles the American species and belongs to the section *TERNSTROEMIA*, to which most of the American species belong. On the other hand, *T. polypetala*, from eastern Africa, belongs to the section *ERYTHROCHITON* and resembles the majority of the Asiatic species. However, this suggestive geographical arrangement is of no true significance since there are members of both sections in both hemispheres.

The environments of the two species are strikingly different. Although both are found at approximately 5° S. Lat., *T. africana* grows at sea level along the river Congo, while *T. polypetala* was collected at an altitude of about 5400 feet in the mist forest of Tanganyika.

Ternstroemia polypetala Melchior, Notizbl. Bot. Gart. Berlin 11: 1095. 1934.

Tree 10–12 m. high; branchlets verticillate or subverticillate, terete, gray. Leaves verticillate, disposed at the apex of the branchlets, chartaceous-coriaceous, obovate, 5–10 cm. long, 2–4 cm. wide, dark red above, paler beneath, rounded or obtuse at the apex, cuneate at the base, the margin involute, sparingly glandular-denticulate, the midrib depressed on the upper surface, elevated below, the veins ca. 7 pairs, conspicuous below because of red color of veins against lighter background of leaf-blade; petiole up to 7 mm. long, appearing winged because of fine tapering decurrence of the leaf-blade. Flowers dioecious, axillary, solitary; pedicel ancipitous, 2–3 cm. long, thickening somewhat toward the apex; bracteoles 2, alternate below the calyx, lanceolate, ca. 4 mm. long, 2 mm. wide, ridged on the median of the dorsal surfaces, a single gland at the apex; calyxlobes 5, rounded, unequal, the outer two lobes thicker, ca. 3 mm. long and 3.5 mm. wide, the inner lobes 3.5–4.0 mm. long, 4.5 mm. wide, the margin subscariosus. Staminate flowers: corolla-lobes basically 5 (occasionally 2–5 additional smaller modified petals), obovate, ca. 10 mm. long, 6.5–7 mm. wide, rounded at the apex, connate at the base; stamens ca. 60, in several series, very unequal in length (3, 4, 5 and 6 mm. long), the longer ones, in the outer series, with filaments 1.5 mm. long, connate, and adnate to the base of the corolla, the anthers ca. 3 mm. long, the connective projecting into a mucro 1.5 mm. long, the inner, smaller stamens more abundant, proportionally smaller in filaments and anthers, the mucro about the same as the longer outer stamens; pistillodium lacking. Pistillate flowers (not seen) fide Melchior: Stamens much reduced, fewer in number, in two series; ovary conical ovoid, 2-loculate, each locule 2-ovulate, the apex contracted into a short, entire style; stigma 2-parted, each part convex and rounded, ca. 2 mm. across. Fruit (not seen) conical, ca. 1.5 cm. long, 0.8–1.0 cm. diameter, often crowned by the persistent style and stigma; seeds normally 4, two to each locule, occasionally less in number by abortion, ca. 9 mm. long and 5.5 mm. across, covered with a yellow, mealy aril.

Tanganyika: Morogoro District, northwest side of the Uluguru Mts., near Lupanga, mist forest at 1800 m. alt., *H. J. Schlieben 3152* (y, lectotype), Dec. 22, 1932 (tree 10–12 m., flowers yellowish white).

The collector of the type states in his notes that both flowers and fruit were collected and Melchior in his original description fortunately described both, for the original specimen has been destroyed. However, Yale University has a duplicate specimen of *Schlieben 3152* which has been available to me for study. This duplicate, which now must become the lectotype, is woefully lacking in both flowering and fruiting material. Only a single, unattached staminate flower with a broken pedicel was found in a packet on the sheet. Since this flower was unattached, I ventured to use it in a dissection for my study and carefully re-pressed the material for future reference.

It is odd that Melchior in his original description designated the species as belonging to the section *ADINANDRELLA*, the same name used generically seven years previously for Exell's Angolan species. To my mind the species belongs to the Asiatic section *ERYTHROCHITON* as I do not find enough variation to warrant the creation of a new section. I am certain that Melchior, like myself, had never associated Exell's *Adinandrella* with *Ternstroemia* or he would have mentioned it in his treatment of the species. Melchior does not designate the section *ADINANDRELLA* as new, and, knowing his fastidious methods of presentation, I feel that it probably had been initiated in some previous publication. If so, I have never encountered it in my studies.

The name *T. polypetala* was selected by Melchior because of the many "petals" found in the flower. The single dissection made by the present author showed five basic petals, obovate in shape, rounded at the apex and measuring about 10 mm. in length and 6.5–7 mm. in width. These are typical petals for the genus in arrangement and size, especially when compared with the arrangement and size of the five calyx-lobes. There were also six other "pseudo-petals," much smaller, measuring only 6 mm. long and 3.5 mm. wide, arranged between the basic petals and the stamens and appearing at first as a second petal series — which they are not. In *Ternstroemia*, the five petals, like the calyx-lobes, always increase in size and change in texture from the smaller, thicker, outer ones to the larger, more membranaceous, inner one. In *T. polypetala*, this is true of the five basic petals, but the inner "pseudo-petals" are all very membranaceous, definitely involute, and in an arrangement inconsistent with that of the true petals. The "pseudo-petals" are bunched in three groups: (1) a single "pseudo-petal" is between two outer petals; (2) two are together, one in front of the other, but again between two outer petals; and (3) three are together, two in front of an outer petal and the third between that and the next outer petal.

Throughout the genus the stamens are always connate at the filament base, and in the outer series the filaments are adnate to the base of the corolla. In flowers in which there are more than a single series, the stamens in the outer series are usually larger. The inner "pseudo-petals" in

T. polypetala are a part of the outer series of stamens and, therefore, are likewise joined with the regular petals at the base. At the points where the inner "pseudo-petals" are found, the stamens are joined to them, rather than to the outer petals.

Thus the arrangement, size, shape and stamen attachment all indicate that the inner "pseudo-petals" are modified stamens. Regrettably, only a single staminate flower was available, and the only known pistillate flowers have been destroyed. I cannot but feel, however, that the interpretation of the "pseudo-petals" as modified stamens is correct and that pistillate flowers will also prove to have only five basic petals since the stamens have already been recorded as reduced to staminodia in these flowers. However, this is an assumption which cannot be verified until more material is available.